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September 14, 1990

Contact: Joseph Landolfi
727-0085

Secretary of Human Services Philip W. Johnston today informed Secretary of Environmental Affairs John DeVillars of his recommendation concerning the proposed siting of a hazardous waste incinerator in Braintree by Clean Harbors of Braintree, Inc.

Secretary Johnston's recommendation to the Executive Office of Environmental Affairs is attached. Copies of the Department of Public Health's site suitability analysis may be obtained by contacting Mary Ann Hart, Department of Pubilc Health at 727-0201.

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EXECUTIVE OFFICE OF HUMAN SERVICES • ONE ASHBURTON PLACE • BOSTON, MASSACHUSETTS 02108

Michael S. Dukakis, Governor

Philip W. Johnston, Secretary

The Commonwealth of Massachusetts
Executive Office of Human Services
One Ashburton Place, Room 1109
Boston, Massachusetts 02108

MICHAEL S. DUKAKIS
GOVERNOR
PHILIP W. JOHNSTON
SECRETARY

MEMORANDUM

TO: John DeVillars, Secretary
Executive Office of Environmental Affairs

FROM: Philip W. Johnston, Secretary

DATE: September 14, 1990

RE: Executive Office of Human Services' (EOHS) Recommendation Regarding Site Suitability of the Proposed Clean Harbors of Braintree, Inc. Rotary Kiln Incinerator Based on Department of Public Health's Findings Regarding Its Potential Impact on the Public Health

You have asked our Secretariat as part of your review of the suitability of the proposed site of a Rotary Kiln Incinerator in Braintree, to inform you by September 18, 1990 of our "preliminary judgment as to the suitability of this site" with particular focus on its potential impact on the public health. Certificate of the Secretary of Environmental Affairs on the Supplemental Draft Environmental Impact Report, Rotary Kiln Incinerator, Clean Harbors of Braintree, Inc., at p. 3.

In response to your charge to the Secretariat and based on the attached findings by the Department of Public Health, it is my considered judgment that this site is not suitable for the proposed incinerator.

My judgment is based on a number of key factual findings by the Department's study, including:

(1) Health data show that the nearest communities, e.g., Quincy and Weymouth, have greater rates of respiratory disease than those for the the state.

(2) There are a number of "sensitive" groups of people living in close proximity to the site -- elderly people, for example, represent a greater proportion of the population close to the site than in the Commonwealth.

(3) The area within one mile of the site has a number of health care facilities for the mentally ill and elderly, housing for the elderly, and schools.

These findings supported the following conclusions:

(1) The people living close to the site have an excess of respiratory health problems which may predispose them to other health problems if they were exposed to normal emissions from the facility or excessive emissions in the event of an accident.

(2) The elderly people (which make up a higher-than-averge proportion of those living close to the site) may be predisposed to health problems if they were exposed to normal emissions from the facility or excessive emissions in the event of an accident.

(3) It is doubtful that in the event of an emergency, residents living close to the site, particularly disabled and elderly people, could be safely and promptly evacuated.

While I am extremely sensitive to the need of the Commonwealth for additional waste facilities and to the delicate balance that must be struck in siting decisions, I am convinced that based on the potential impact of the proposed facility on the public health, the balance tips clearly against the siting of such a facility at the proposed site.

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Massachusetts Department of Public Health Conclusions on Site Suitability of the Proposed Clean Harbors of Braintree, Inc. Rotary Kiln Incinerator

September 12, 1990

I. Introduction

As part of the Commonwealth's ongoing work relative to the siting process for the proposed Clean Harbors of Braintree, Inc. (CHBI) rotary kiln hazardous waste incinerator, the Department of Public Health (DPH) provided comments on related health issues to Secretary DeVillars in May, 1990.[12] While the DPH raised several important concerns deserving of consideration, a formal and final judgement on site suitability was not deemed possible by Secretary DeVillars based upon issues that were still outstanding.

After review of all agency comments, Secretary DeVillars requested that the staff from the Executive Office of Human Services (EOHS/DPH) "conduct the appropriate analyses" necessary to make a final judgement on the health status of residents in Braintree, Quincy, and Weymouth, the communities of concern in this issue. The DPH has always felt that it would have been desirable to have conducted a health study with a sufficient response rate (as originally requested of the CHBI) in order to have the clearest picture of health status. In the absence of such additional health data we believe it is still possible to look at a number of existing data sets and make a final determination on site suitability as it relates to public health.

With regard to 310 CMR 30.705, five regulatory criteria are established for the Massachusetts Department of Environmental Protection (DEP) for the purpose of evaluating the suitability of a proposed site, such as the Clean Harbors Rotary Kiln Incinerator (RKI). These criteria are:

(a) The transportation risk(s) associated with waste(s) arriving at, or leaving, the facility;

(b) The adequacy of buffer zones between the active portion(s) of the facility and areas of public access;

(c) The population density in the vicinity of the facility site;

(d) The proximity of the facility to sensitive receptors (e.g., schools, hospitals, nursing homes, day care centers); and

(e) Where applicable, the proposed method(s) of evacuation of threatened populations within a reasonable time after an accident.

The basis for the criteria is the protection of the health and safety of those populations potentially impacted by the operation of a facility. The focus of the DPH review was to evaluate the potential for the proposed RKI site to adversely impact the population in the area by considering the health status and demographics of the population.

Inclusion of this type of information was discussed with staff from the Executive Office of Environmental Affairs in meetings subsequent to Secretary DeVillars' request and deemed appropriate.

II. Town-Level Health Status

A main objective of the DPH evaluation was to determine if sensitive populations are located in the general area of the proposed site. The determination of health status is one means of identifying sensitive populations. The concept of sensitivity refers to responsiveness to a pollutant. This responsiveness relates to an individual's increased susceptibility to lower doses of a pollutant that can predispose an individual to some adverse health effect or exacerbate an existing health condition.

If a population or subset of that population presents with some health problem of concern, then that population or population subset can be considered sensitive. The principal means of establishing if a population presents with a health problem is to determine if a statistically significant excess of disease exists. Consistency of an excess, in the absence of statistical significance, is another means of establishing a population's health status. The focus in this report will be respiratory disease because of the types of pollutants anticipated and the pathway of exposure (inhalation).

The examination of town-level health data permits a statement to be made about the health status of a community in its entirety. The CHBI, through the Preliminary Project Impact Report (PPIR)[13], presented primary and secondary health data on the town-level. Previous DPH comments have concluded that the results of the primary health survey are invalid because of the extremely low participation rate (less than 40%). With a response rate this low, the likelihood of substantial bias is great. This bias would reduce the probability of detecting health problems that might actually exist.

Table 3-1 of the PPIR is reproduced here to highlight the findings of the CHBI secondary data analysis for respiratory disease. The main findings of concern were that lung cancer mortality for the community of Quincy and lung cancer incidence for Quincy and Weymouth were significantly in excess when the occurrence of lung cancer was compared to the Commonwealth. Mortality for bronchitis, emphysema, and asthma was also elevated for the three communities. It has been argued by CHBI that the health status of the communities is not significantly different than comparison populations and therefore, is not sensitive with respect to health. This conclusion was based solely on comparison with the matched control communities. Comparisons with the Commonwealth were ignored on the basis that CHBI felt the matched communities

TABLE 3-1
RESPIRATORY DISEASE SUMMARY

Health Outcome and Comparison Group	Risk Ratio			
	Total Study	Braintree	Quincy	Weymouth
Comparison to Commonwealth				
Lung Cancer (I)	111*	106	112*	112
Lung Cancer (M)	115*	100	117*	120*
Laryngeal Cancer (I)	84	53	118	44*
Bronchitis, Emphysema, Asthma (M)	125*	137	116	135
Pneumonia (M)	93	78*	92	106
Comparison to Respective Control Towns				
Lung Cancer (I)	104	97	99	103
Lung Cancer (M)	106	97	109	111
Laryngeal Cancer (I)	89	60	126	43*
Bronchitis, Emphysema, Asthma (M)	120*	138	96	134
Bronchitis and Asthma (DRG)	76*	74*	101	64*
Chronic Obstructive Lung Disease (DRG)	59*	60*	67*	43*
Interstitial Lung Disease (DRG)	68*	73	70*	66
Pneumonia (M)	103	82	103	118
Pneumonia and Pleurisy (DRG)	81*	91	96	66*

Key: M = Mortality, I = Cancer Incidence, DRG = Hospitalizations

*Approximate 95% significance limits do not include 100. Note: For DRG data, the number of hospitalizations per individual for the same condition is not known.

were more socio-demographically similar to the study communities than the Commonwealth.

We applied to the Commonwealth the selection criteria used by the CHBI to choose the comparison communities (± 25% variation in median income, ± 5% variation in other variables). The table below summarizes those results and shows that the Commonwealth satisfies all the criteria for the community of Quincy.[4] All the criteria except percent white are satisfied for Weymouth.

	% Female	% White	% Foreign Born	% College Grad	% Households Below Poverty Level	% <18	% 65+	Household Median Income
Braintree	52.7	99.0	6.3	17.8	2.7	26.0	13.1	22,638
Quincy	54.3	98.4	8.4	15.8	6.9	21.2	17.1	17,376
Weymouth	52.5	98.8	4.4	14.8	6.4	26.4	11.3	19,505
Commonwealth	52.4	93.5	8.7	12.0	9.3	26.0	12.7	17,575

Because of the similarity of the socioeconomic and demographic characteristics of the Commonwealth to those of Quincy and Weymouth, the results of the health comparisons between the study communities and the Commonwealth cannot be ignored. It is particularly important to understand that comparisons to the Commonwealth involve larger populations and, consequently, more stable disease rates than comparison with the control communities. This enhances the probability that important and true differences can be detected.

III. Small-Area Health Status

Town-level health data give some indication of health status but is not the best information to address the question of site suitability. This is

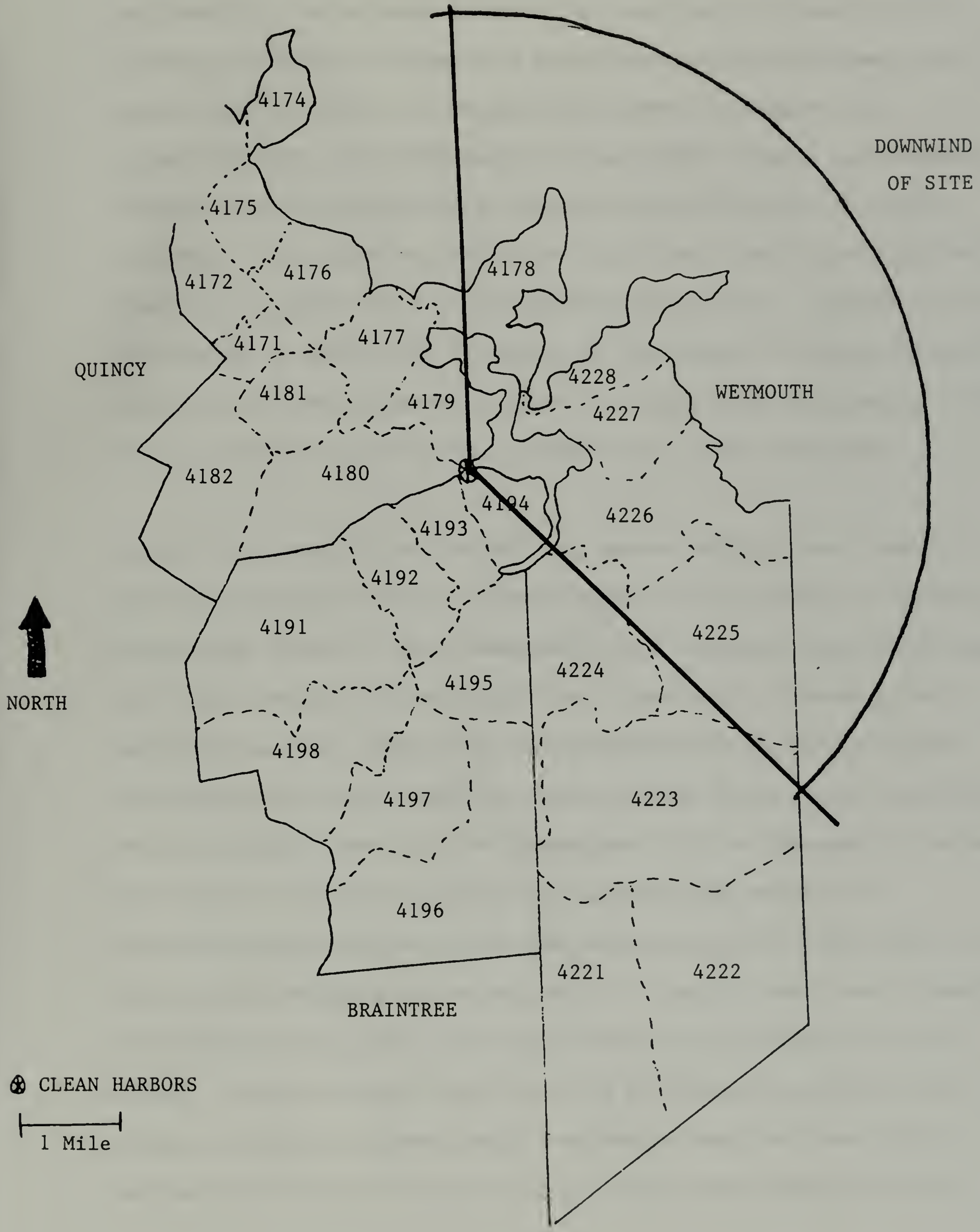
because the area potentially affected by the RKI would not likely be an entire community but that part of the community in the general area of the site.

The DPH had previously conducted an analysis of lung cancer incidence by census tract in the three town area.[1] The findings of the age-adjusted DPH lung cancer incidence data that are relevant here include:

o Several census tracts have significantly elevated rates of lung cancer incidence (see attachment 1). Three of these tracts (4178, 4226, & 4227) located just to the north, east, and southeast of the proposed site are each downwind of the site for a greater percentage of hours than all but one of the other tracts immediately surrounding the site, based upon the CHBI on-site 10 meter annual wind rose (see map below). Though CHBI, in their supplementary impact report, examined the DPH data in terms of proximity to the site, their analysis did not appear to properly account for wind direction. Even using the possibly flawed CHBI data, the observation holds true that the three tracts with elevated lung cancer incidence in the Fore River Basin Area are downwind from the proposed site for a combined total of approximately 67% of the hours, on an annual basis.

o The number of significant elevations in lung cancer incidence on the census tract level was greater than the number expected even after taking into consideration multiple comparisons. Approximately three significant elevations would be expected by chance alone because of the number of multiple statistical comparisons made. However, seven significant elevations were observed in the Department of Public Health study. Even if only three significant elevations were found, the observation that three elevations could occur by chance does not mean that the three elevations are not real. The observation only means that

Map showing Census Tracts in the Fore River Basin Area with respect to Braintree, Quincy and Weymouth and highlighting the area of elevated lung cancer downwind of the CHBI site.



the probability is small. It should also be noted that the issue of adjusting statistical significance for multiple comparisons is controversial. Adjustment for multiple comparisons is done so that an erroneous conclusion indicating a significant difference between two populations is avoided. This approach, however, increases the probability that real differences will be missed. From a public health standpoint, the objective is to identify and mitigate public health problems. This cannot be accomplished by taking a statistical approach that increases the chance of not identifying problems. Therefore, the DPH finding of significant elevations of lung cancer in census tracts in the Fore River Basin Area is a relevant finding; the importance of which is not diminished by the number of statistical comparisons made.

o The CHBI also argued that the DPH lung cancer study did not identify a burdened population because its reanalysis of the DPH data using control communities instead of the Commonwealth as a comparison population found only three instead of seven significant elevations. Because of the multiple comparison issue, CHBI concluded that the three significant elevations found were, therefore, due to chance alone. From discussion earlier in this report, the DPH showed that (1) the Commonwealth matched as closely to the town of Quincy and Weymouth with respect to socio-demographic factors as the CHBI selected control communities and (2) the Commonwealth provides more stable rates for comparison, thereby, reducing the probability that a real difference or elevation will be missed. Because of these facts, the DPH findings of significant lung cancer incidence in census tracts immediately north and east of the proposed site not only remain valid but have greater relevance from a

public health standpoint than those findings put forth by CHBI.

- o The explanation for the elevation is not known. While both smoking and environmental factors were and should be explored as possible etiologic factors, the DPH study was not designed to determine cause but only to provide an analysis of existing data. In the CHBI effort to develop information on health status, it is important to note that the cause of a health problem is of secondary importance to the actual existence of a health problem.

Similarly, cancer incidence data for other types of cancer for the three towns Quincy, Braintree, and Weymouth were obtained for the years 1982-1986 from the Massachusetts Cancer Registry.[3] Standardized Incidence Ratios (SIRs) were calculated for each town by census tract for cancers of the liver, bladder, kidney, leukemia, multiple myeloma, lymphoma and pancreas (see Attachment 2). SIRs were also calculated for the cancer types combined, including lung cancer.[2,4]

Pancreatic cancer incidence among males in census tract 4228 in Weymouth was statistically significantly elevated. There were no statistically significant elevations observed among any of the other cancer types considered separately in any of the census tracts bordering the Fore River Basin area. When the cancer types were combined, cancer incidence in CT 4178 (Germantown/Houghs Neck area) was statistically significantly elevated. However, the excess of lung cancer cases largely accounts for this elevation. Elevated SIRs for the combined cancer types were observed in all of these census tracts bordering the Fore River Basin Area. These elevations were not statistically significant but may be suggestive of a general pattern of somewhat higher cancer incidence in this area.

In summary, the DPH study of lung cancer incidence by census tract in Quincy, Braintree, and Weymouth suggests that the population living in census tracts adjacent and downwind of the proposed site may be experiencing more chronic respiratory health problems than most of the other census tracts in the towns and more than each of the towns when considered as a whole.

IV. Small-Area Demographics

For purposes of this report we have defined the sensitive receptor population in two ways. In sections II and III we have discussed the populations that are "sensitive" based on respiratory health. This chapter shall focus on sensitive receptors with respect to age (i.e., the "young" or < age 18 and the "old" ≥ 65). We reviewed the sensitive receptor population throughout the three community area in order to determine the population distribution within the area of greatest potential impact (i.e., one-mile radius) as compared to the "remainder of Braintree, Quincy, and Weymouth" (BQW). We also compared the area of greatest potential impact with the Commonwealth.

The data presented in the table below were derived from the 1980 U.S. census to maintain consistency with all other analyses conducted by the DPH and others.[4] Census block data was used to determine the population characteristics for those living within one-mile of the site. The data indicate that there is a smaller percentage of young (i.e., <18) and a greater percentage of elderly sensitive receptors (i.e., ≥ 65) living within the one-mile radius of the proposed facility than both the percent of sensitive receptors living in the remainder of the three towns and in the Commonwealth as a whole.

	Total Population	Population ≥ 65	% of Total
Commonwealth	5,737,037	726,531	13%
BQW*	161,505	22,758	14%
1 mile radius BQW	14,996	2,748	18%

	Total Population	Population <18	% of Total
Commonwealth	5,737,037	1,490,389	26%
BQW	161,505	38,907	24%
1 mile radius BQW	14,996	3,188	21%

*BQW = Area of Braintree, Quincy and Weymouth beyond a one-mile radius of the site.

In order to evaluate the importance of the differences observed in the elderly population, we applied a test of statistical significance.[14] In both comparisons statistical significance was achieved (p. <.001). This finding shows that the area in close proximity to the site is comprised of a high proportion of a second type of sensitive receptor, those ≥ age 65.

V. Health Risk Assessment

In its Health Risk Assessment, CHBI has concluded that health risks from the normal operation of the RKI would result in "acceptable risks". In evaluating the public health impact of the proposed RKI, one must be careful to use the health risk assessment in its proper context. A risk assessment is a quantitative prediction of the likelihood of an impact occurring because it is not possible to directly measure this impact. From a public health perspective, the DPH must consider both quantitative and qualitative parameters. CHBI claims that they have accounted for all segments of the

population including sensitive receptors in the health risk assessment and, as such, do not need to do anything further. This claim is based on:

1. How emissions from the proposed facility will affect the average individual and sensitive populations (such as children) receiving the maximum lifetime exposure through ten routes; and
2. Use of conservative assumptions. CHBI claims that, "the result of using the conservative assumptions is that the calculated risk is representative of a sensitive individual and substantially overstates the risk to the average person in the community".[5]

This claim is not accurate. The safety factors employed in a risk assessment do not account for all sensitive populations but, in fact, are based on the variability of sensitivity to average healthy humans. If the sensitive population is children, as has been claimed above, then that population is usually accounted for by safety factors incorporated in the risk assessment process and the derivation of cancer potency values and reference doses. However, the sensitive population of concern here is the disease-burdened, elderly, and the risk factor-predisposed segments (e.g., those who are smokers) of the population. This segment should be accounted for if not quantitatively in the risk assessment, then in a qualitative manner because it represents a real situation not a hypothetical one. An examination of the conservative assumptions used in the assessment shows that an overestimation of risk can only be fairly claimed for the average individual and not the sensitive segment of the population. Additional concerns include:

1. A risk assessment is limited in that it approaches the evaluation of risk in an additive manner, while the risk may actually be higher due to the synergistic effect from exposure to multiple chemicals; and

2. The reference dose estimates used in the CHBI Health Risk Assessment are based on a small number of experimental animal studies and, consequently, these studies may not provide the best estimate of risk considering the specific target organ of concern in this population (lung).

The points expressed above are not intended to negate the value of a risk assessment but to view its value from the proper perspective. A risk assessment is a tool to provide information and guidance on the estimated public health consequences of exposure to a chemical. The uncertainty that is inherent in a risk assessment requires that it be used only as a tool for guidance and not for reaching a definitive judgement on the acceptability of risk. It is a tool that should be viewed with respect to other known health and demographic parameters that characterize the population that may be impacted by the facility. Because of these parameters and the uncertainties of a risk assessment, the DPH is of the opinion that the CHBI risk assessment must be interpreted with caution and that a definitive conclusion that indicates the facility will pose "no unacceptable risks" cannot be made.

VI. Buffer Zone

In formulating worst-case risk scenarios, assumptions are made to, in part, identify a zone of maximum impact in the event of a worst-case accident occurring. Much is not known about the impact of such events on a population. Evidence of this is in the application by CHBI of a method (dose of concern) used primarily for risk management rather than hazardous waste siting facility decisions. The CHBI efforts were a sincere attempt to provide some

quantitative guidance regarding the protection of individuals in an accident scenario. However, for the protection of public health in the absence of proven methods, a more qualitative approach toward prudent exposure avoidance is more appropriate. As a result, a buffer zone of only 869 feet is not considered consistent with the public health concept of prudent exposure avoidance in the event of either worst-case or accident scenario.

VII. Evacuation Plans

DPH has utilized existing data sources to complete a list of facilities in Braintree, Quincy and Weymouth which serve a large population of individuals who are considered sensitive receptors. Those facilities within one-mile of the site are presented in the table below.[6,7,8,9]

This table does not correspond with that provided by CHBI in its report dated August 10, 1990 as DPH has identified an additional school, nursing home, and an elderly housing facility not indicated on table 2-7 of the CHBI report.[5] This discrepancy could be explained by the fact that DPH has used building 6 of the CHBI proposed site as the center of the one-mile radius while CHBI has used building 4. This discrepancy could further be explained by examination of figure 2-2 on page 2-12 of the CHBI August 10, 1990 report. The map shown in this figure is distorted in scale for Braintree and part of Weymouth so that the scale in this portion of the map is larger. Sensitive receptors near the border of the one-mile radius area could have been misplacedoutside the one mile radius if CHBI used an incorrectly scaled map to determine the one-mile radius area of the site.

Sensitive Receptors within One Mile of the Proposed CHBI Facility

Health Care Facility	Distance From Site	Population	Town
South Shore Mental Health Center	≤ 1/2 Mile	50	Quincy
Resthaven Nursing Home	≤ 1 Mile	49-Level I & II* 24-Level III**	Braintree
Pope Nursing Home	≤ 1 Mile	37-Level III**	Weymouth
Elderly Housing			
Franklin McCrae/Heritage Lane	≤ 1/2 Mile	104	Braintree
One Thousand Southern Artery	≤ 1 Mile	882	Quincy
Sawyer Towers	≤ 1 Mile	166	Quincy
Pagano Towers	≤ 1 Mile	172	Quincy
Schools			
St. Joseph's School	≤ 1 Mile	260	Quincy
Ross School	≤ 1 Mile	285	Braintree

* Twenty-four hour skilled nursing care and availability of restorative and other therapeutic services. Skilled services are nursing, rehabilitative, or other medically-related services requiring supervision by a registered nurse or licensed therapist.[10]

** This level provides routine nursing care and assistance with activities of daily living, with periodic availability of skilled services. Nursing supervision (R.N. or L.P.N.) is required during day and evening shifts only. Health-related care is provided on a regular basis to individuals who do not require the degree of care and treatment which a hospital or skilled nursing facility is designed to provide, but who, because of their mental or physical condition, require care and services above the level of room and board, and this care and services can be made available to them only through institutional facilities.[10]

If an emergency situation were to occur at CHBI requiring evacuation within the one mile radius the above mentioned facilities would require particular attention. If school were in session at the time of an accident, up to 545 children would need to be transported to a safe area on short notice.

Up to approximately 1300 senior citizens would also need to be transported to safety as well. This situation presents more complex evacuation difficulties in that large numbers of elderly are located in small geographic areas and must be evacuated in a short time. The feasibility of evacuating such a large number of elderly from any single location within a limited timeframe is questionable. The process would be further complicated by the medical conditions of the residents (those requiring special medications, wheelchair bound, etc.).

In addition, transportation for non-ambulatory elderly and the availability of emergency shelters providing the proper care would be necessary. Several facilities within one mile of the site house special care populations.

South Shore Mental Health Center is within one half mile of the CHBI site. It services approximately fifty mental health patients daily. Approximately twenty of those patients are long term residents of the facility.[11] Evacuation of the South Shore Mental Health Center would require the availability of supervised transportation of a capacity that would allow supervision and segregation of special needs patients from the general patient population. An adequate evacuation plan would have to include the availability of a shelter capable of receiving mental health patients requiring inpatient services.

The Pope and Resthaven nursing homes have a combined population of one hundred and ten patients. The Pope Nursing Home has thirty seven residents all requiring level III nursing care.[9] Level III patients require routine nursing supervision only and are relatively independently ambulatory. An evacuation shelter would require a nursing staff for assistance only.

Resthaven Nursing Home has a population of twenty-four level III patients requiring a similar level of care as those of the Pope facility. It also maintains forty-nine level I and II patients, however. Level I and II patients require twenty-four hour skilled nursing care and the availability of restorative and therapeutic services. There would be no alternative but to evacuate these persons by ambulance to a hospital or other level I and II nursing facilities. The feasibility of evacuating forty-nine patients in a relatively short period of time appears questionable. These patients would need to be sent to either Quincy Hospital or another nursing home in the area but with enough empty beds to accommodate the level I and II persons.

The 1987 DPH nursing home census indicates that the 24 nursing and rest homes which exist in Quincy, Braintree, and Weymouth maintained an average overall occupancy rate of 96 percent. Only twelve of the twenty-one nursing and rest homes have level I and level II facilities available with an average of seventy-three level I and II beds per facility. If we assume that the average 96% of the Level I and II beds were occupied in the eleven available level I and II nursing homes outside the one mile radius, then seventy of the seventy-three beds per home would be filled. This leaves approximately three level I and II beds per facility available, or a total of thirty-three level I and II beds for Braintree, Quincy, and Weymouth combined.

If CHBI were to have an emergency requiring the evacuation of persons within a one mile radius of CHBI, it is likely that either during the accident or during evacuation of the area, injuries would result particularly when considering the large population in Braintree that would require evacuation. Potential injured parties would include CHBI workers, residents in the process of evacuation, and emergency response personnel. Emergency vehicles would likely bring the injured to Quincy Hospital as it is the closest hospital to CHBI.

With this in mind, it seems unlikely Quincy Hospital will be able to accommodate large numbers of elderly in need of level I and II care coming from Resthaven Nursing Home. These forty-nine persons then will likely need to be dispersed throughout the eleven remaining nursing homes capable of level I and II care. We previously determined, however, that only about thirty-three total beds would be available at any given time and only about three would be available per facility. The remaining sixteen persons would probably need to be sent further away to facilities in neighboring towns.

There must be sufficient staff, ambulance coverage, and other appropriate transportation to coordinate and evacuate, school children, the senior citizens in elderly housing, the mental health patients, and the nursing home patients. It is highly questionable that enough transportation will be available to make a timely evacuation a feasible proposition.

VIII. Community Concerns

The DPH has received more than 300 calls and correspondence from residents, advocacy groups, local health and government officials as well as physicians living and/or practicing in some part of the three community area,

all of who have voiced concern. Those concerns include potential health effects that may result from less than adequate operation of the facility during an accident (i.e., inadequate evacuation procedures in a densely populated area) as well as a major concern over what is not known regarding hazardous materials going into the facility and ultimately coming out of the facility as pollutants into the ambient environment.

While it may be argued that a number of these concerns result from individuals simply not wanting such a facility in "their backyard", a substantial number of concerns raised are valid and have been addressed to the extent possible in previous sections of this report.

IX. Conclusions

The DPH judges the site proposed by CHBI for a Rotary Kiln Incinerator to not be suitable. This determination is based on the following conclusions:

- Town-level health data demonstrate excess respiratory disease in the communities of Quincy and Weymouth;

- The populations presenting with the respiratory health problem appear to be principally those residing in Quincy and Weymouth census tracts located in close proximity to the proposed site;

- The town-level and small-area health data suggest that the population potentially impacted by the proposed site, as a result of both normal operating conditions and upset operating conditions, can be characterized as sensitive populations with respect to respiratory health;

- Meteorological data indicate that the population sensitive with respect to respiratory health would likely be impacted by the site because of their downwind location from the proposed site;

- Demographic data show that the area within close proximity to the proposed site (within one mile) can be characterized as an elderly population with a greater proportion of 65+ individuals than the Commonwealth as a whole and the areas of Braintree, Quincy and Weymouth beyond a one-mile radius of the site;

- The CHBI health risk assessment does not take into consideration all sensitive populations and therefore, the CHBI conclusion that the RKI will pose "acceptable risks" under normal operating conditions must be interpreted with caution;

- The CHBI worst-case risk analysis is based on broad assumptions and incomplete science necessitating the designation of a buffer zone beyond 869 feet in order to be based on prudent exposure avoidance rather than strictly quantitative estimates; and

- In the event of an emergency, the feasibility of adequate evacuation of residents, particularly populations of ambulatory and non-ambulatory elderly residents is doubtful.

X. References

1. Lung Cancer Incidence in Quincy, Weymouth and Braintree, 1982 - 1986; Massachusetts Department of Public Health, Division of Environmental Health Assessment, July 1989.

2. Massachusetts Department of Public Health, Division of Health Statistics, Research and Evaluation; 1988

3. Massachusetts Department of Public Health, Cancer Registry; 1989

4. Characteristics of the Population of Massachusetts, 1980 Census Data for the Population, U.S. Department of Commerce, Bureau of the Census.

5. Comments on Site Suitability for the Rotary Kiln Incinerator Project,-_ Clean Harbors of Braintree, Inc., August 10, 1990

6. Identification of elder housing, day care centers and schools for the City of Quincy was provided in Comments of the City of Quincy Regarding Site Suitability for Clean Harbors, Mayor's Office, Quincy, MA, August 7, 1990

7. Elder housing information for Braintree was obtained from the Braintree Housing Authority; School data was obtained from the Braintree Superintendent of Schools; Day care center information was obtained from the Commonwealth of Massachusetts Office for Children.

8. Elder housing information for Weymouth was obtained from the Weymouth Housing Authority; School data was obtained from the Weymouth Superintendent of Schools; Day care center information was obtained from the Commonwealth of Massachusetts Office for Children.

9. Massachusetts Nursing and Rest Home Databook, 1978 - 1987, Massachusetts Department of Public Health, Division of Health Statistics, Research and Evaluation, Health Resources Statistics Unit; May 1988

10. Elderly Residents of Massachusetts Nursing and Rest Homes: A Profile, Massachusetts Department of Public Health, Division of Health Statistics, Research and Evaluation, Health Resources Statistics Unit, June 1989, pp. 32 - 33.

11. Telephone conversation between Hospital Administrator and DPH, August 1990.

12. Memorandum to John DeVillars from David Mulligan, April 30, 1990

13. Rotary Kiln Incinerator Project, Preliminary Project Impact Report, Clean Harbors of Braintree, Inc. 1990.

14. Daniel, Wayne W., Biostatistics: A Foundation for Analysis in the Health Sciences, 2nd Edition. John Wiley and Sons, Inc., New York, 1978.

Attachment 1

Table 1

Standardized Incidence Ratios
1982-1986 Lung Cancer
Quincy, MA

Males

				95% Confidence Intervals	
	Obs	Exp	SIR	Lower Limit	Upper Limit
Town	226	211.4	107	93	122
4171	14	11.3	124	68	208
4172	14	17.1	82	45	137
4173	0	0.3	0	—	—
4174	6	7.3	82	30	179
4175	26	21.3	122	69	155
4176	24	24.6	98	63	145
4177	16	19.7	81	46	132
4178	30	19.0	158 +	107	225
4179	26	23.8	109	71	160
4180	31	25.6	121	82	172
4181	23	15.6	147 +	93	221
4182	16	13.0	123	70	200

Note: all figures rounded
Statistical significance not calculated where the number of cases is < 5.

+ = indicates statistical significance at $p < 0.05$
++ = indicates statistical significance at $p < 0.01$

Attachment 1 continued

Table 2
Standardized Incidence Ratios
1982-1986 Lung Cancer
Quincy, MA

Females

	Obs	Exp	SIR	95% Confidence Intervals Lower Limit	Upper Limit
Town	127	107.1	119 +	99	141
4171	2	6.2	32	4	117
4172	8	9.8	82	35	161
4173	1	0.1	999	13	5564
4174	11	12.1	91	27	256
4175	4	4.0	100	45	163
4176	12	15.9	76	39	132
4177	16	11.7	137	78	222
4178	18	11.3	159 +	94	252
4179	21	16.2	130	80	198
4180	16	15.8	101	58	165
4181	12	8.4	143	74	250
4182	6	6.9	87	32	189

Note: all figures rounded
Statistical significance not calculated where the number of cases is < 5.

+ = indicates statistical significance at $p < 0.05$
++ = indicates statistical significance at $p < 0.01$

Attachment 1 continued

Table 3
Standardized Incidence Ratios
1982-1986 Lung Cancer
Weymouth, MA

Males

	Obs.	Exp	SIR	95% Confidence Intervals Lower Limit	Upper Limit
Town	123	121.2	101	84	121
4221	7	8.9	79	32	162
4222	18	14.9	121	72	191
4223	18	17.1	105	63	166
4224	16	17.2	93	53	151
4225	21	16.7	126	78	192
4226	23	13.4	172 ++	109	258
4227	15	8.7	172 +	96	284
4228	5	9.8	51	16	119

Note: all figures rounded
Statistical significance not calculated where the number of cases is < 5.

+= indicates statistical significance at $p < 0.05$
++= indicates statistical significance at $p < 0.01$

Attachment 1 continued

Table 4

Standardized Incidence Ratios
1982-1986 Lung Cancer
Weymouth, MA

Females

	Obs.	Exp	SIR	95% Confidence Intervals Lower Limit	Upper Limit
Town	69	64.1	108	84	136
4221	9	9.0	100	66	303
4222	8	5.2	154	46	190
4223	5	9.2	54	18	127
4224	12	13.2	91	47	159
4225	16	10.3	155	89	252
4226	7	7.2	97	39	200
4227	5	5.0	100	32	233
4228	7	5.1	137	55	283

Note: all figures rounded
Statistical significance not calculated where the number of cases is < 5.

+= indicates statistical significance at p < 0.05
++= indicates statistical significance at p < 0.01

Attachment 1 continued

Table 5

Standardized Incidence Ratios
1982-1986 Lung Cancer
Braintree, MA

Males

	Obs	Exp	SIR	95% Confidence Intervals Lower Limit	Upper Limit
Town	83	78.0	106	85	132
4191	20	13.1	153 +	93	236
4192	9	12.2	74	34	140
4193	11	8.7	126	63	226
4194	9	7.3	123	56	234
4195	6	7.3	82	30	179
4196	12	10.0	120	62	210
4197	4	7.3	55	15	140
4198	12	12.1	99	51	173

Note: all figures rounded
Statistical significance not calculated where number of cases is < 0.05
+ = indicates statistical significance at p < 0.05
++ = indicates statistical significance at p < 0.01

Attachment 1 continued

Table 6

Standardized Incidence Ratios
1982-1986 Lung Cancer
Braintree, MA

Females

	Obs	Exp	SIR	95% Confidence Intervals Lower Limit	95% Confidence Intervals Upper Limit
Town	47	46.0	102	75	136
4191	18	7.0	114	49	225
4192	4	7.5	53	14	137
4193	7	5.3	132	34	228
4194	5	4.9	102	33	238
4195	5	4.4	114	37	265
4196	7	5.2	135	54	277
4197	6	3.8	158	58	344
4198	5	8.1	62	20	144

Note: all figures rounded
Statistical significance not calculated where number of cases is < 5.

+ = indicates statistical significance at $p < 0.05$
++ = indicates statistical significance at $p < 0.01$

Attachment 2

Cancer Incidence 1982-1986 for Combined Cancer Types
Quincy, MA

	Total			Male			Female		
	Obs	Exp	SIR	Obs	Exp	SIR	Obs	Exp	SIR
Town	700	672.5	104	410	388.2	106	290	272.1	107
CT 4171	33	35.6	93	21	22.2	95	12	13.7	88
CT 4172	54	55.5	97	35	33.1	106	19	21.9	86
CT 4173	1	0.9	117	0	0.6	--	1	0.3	328
CT 4174	18	22.5	80	9	14.0	64	9	8.6	104
CT 4175	66	68.3	97	39	41.6	94	27	26.7	101
CT 4176	70	88.9	79	39	48.5	80	31	37.2	83
CT 4177	68	68.1	100	35	38.9	90	33	27.9	118
CT 4178	84	63.5	132+	50	37.1	135+	34	25.5	133
CT 4179	90	89.8	100	44	46.7	94	46	38.5	119
CT 4180	94	87.8	107	63	49.9	126	31	35.8	87
CT 4181	74	49.2	150++	46	30.6	151+	28	19.1	146+
CT 4182	48	42.3	114	29	25.2	115	19	16.7	114

Note: all figures rounded

Obs= Observed cases
Exp= Expected cases
SIR= Standardized Incidence Ratio

+ = statistically significant at $p<0.05$ level
++ = statistically significant at $p<0.01$ level

Attachment 2 (continued)

Cancer Incidence 1982-1986 for Combined Cancer Types
Braintree, MA

	Total			Male			Female		
	Obs	Exp	SIR	Obs	Exp	SIR	Obs	Exp	SIR
Town	258	256.1	101	152	151.7	100	106	101.7	104
CT 4191	47	39.5	119	30	25.5	118	17	14.8	115
CT 4192	31	41.6	75	19	23.9	79	12	16.9	71
CT 4193	35	28.5	123	19	16.9	112	16	11.3	141
CT 4194	30	26.3	114	17	14.2	120	13	11.0	118
CT 4195	24	25.0	96	11	14.2	78	13	10.3	127
CT 4196	32	28.8	111	21	18.8	111	11	10.6	104
CT 4197	20	21.2	94	10	14.0	71	10	7.7	129
CT 4198	39	45.0	87	25	23.9	104	14	19.2	73

Note: all figures rounded

Obs= Observed cases
Exp= Expected cases
SIR= Standardized Incidence Ratio

Attachment 2 (continued)

Cancer Incidence 1982-1986 for Combined Cancer Types
Weymouth, MA

	Total			Male			Female		
	Obs	Exp	SIR	Obs	Exp	SIR	Obs	Exp	SIR
Town	364	354.4	97	224	211.3	106	140	139.8	100
CT 4221	28	28.9	97	16	17.6	91	12	11.3	106
CT 4222	52	50.0	104	34	29.8	114	18	19.7	91
CT 4223	48	51.9	93	34	33.6	101	14	19.2	72
CT 4224	62	70.7	88	32	34.7	92	30	31.2	96
CT 4225	63	55.9	113	37	32.9	112	26	22.1	117
CT 4226	47	40.4	116	31	26.1	119	16	14.9	107
CT 4227	32	27.5	115	21	17.2	122	11	10.8	102
CT 4228	32	28.7	112	19	19.1	99	13	10.4	124

Note: all figures rounded

Obs= Observed cases
Exp= Expected cases
SIR= Standardized Incidence Ratio